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THE ANGORA GOAT.

BY

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REVISED (MAY, 1908) BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., May 14, 1908.

SIR: I have the honor to transmit herewith the manuscript of a revision of Farmers' Bulletin 137, "The Angora Goat." The original bulletin, issued in 1901, was written by Mr. George Fayette Thompson, of this Bureau, who has since died. The present revision has been prepared by Mr. Edward L. Shaw, assistant in animal husbandry in charge of sheep and goat investigations, under the supervision of Mr. George M. Rommel, Animal Husbandman of the Bureau. It is based upon the revised edition (1906) of Bulletin 27 of the Bureau series, "Information Concerning the Angora Goat," supplemented with information from Mr. Shaw's experience and from a recent study made by him of the industry in the field.

The Angora goat industry is now on a firm basis and is a proved success under proper conditions. The interest in the subject and the demand for information continue, so I recommend the publication of the accompanying revised article.

Respectfully,

A. D. MELVIN,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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INTRODUCTORY.

It is probable that as a conservative estimate there are about 1,000,000 Angora goats in the United States at the present time. This estimate is based upon the quantity of mohair purchased by the leading mills, making some allowance for the amount of hair used by other firms for which no figures could be obtained.

The Bureau of Animal Industry sent out blanks in the fall of 1907 for the purpose of securing information regarding the condition of the industry. Most breeders reported increased sales over previous years and that they had been very successful with their goats.

Prices of domestic mohair have been steadily increasing in the last few years, due to the improvement in the quality of the clip and the increased consumption and use of this material.

The increased number of mutton goats sold in the leading markets and the prices received for the same during the past year have offered much encouragement to the industry.

The many misleading statements which were formerly made in the press regarding the Angora, and which did the industry a great deal of harm, have almost ceased, and the industry is being regarded upon its merits and deserves consideration from those who are thinking of giving the Angora a trial.

ORIGIN AND HISTORY.

The Angora breed of goats originated in the vilayet of Angora, in Asia Minor. The city of Angora, or Enguri, the capital city of the vilayet of Angora, is the ancient Ancyra, and is located about 220 miles south by southeast from Constantinople. The province is mountainous to a considerable extent and furrowed by deep valleys.

It was here that this famous goat reached its perfection. That the altitude, the soil, or the climate, or all of them together had much influence in producing this fleece-bearing goat is supported by strong evidence. Dr. John Bachman and the Encyclopedia Britannica both state that the fineness of the hair of the Angora goat may perhaps be ascribed to some peculiarity in the atmosphere, "for it

is remarkable that the cats, dogs, sheep, and other animals of the country are to a certain extent affected in the same way as the goats."

Although this atmospheric effect on the quality of hair is generally accepted, the feed of the animals also has a telling influence, and the experience of Angora breeders show that with good feed and with animals whose blood is adulterated as little as possible with native blood a fleece equal to any produced in Turkey may be obtained.

Mr. Henry O. Binns, who had about twenty years' experience with these goats in the vilayet of Angora, says the pure animals were about bred out in 1863. The reason for this was the extensive crossing with the common Kurd goat, to which reference will be made.

INTRODUCTION INTO THE UNITED STATES.

During the administration of President Polk the Sultan of Turkey requested of him to recommend some one who would experiment in cotton culture in Turkey. Accordingly, Dr. James B. Davis, of Columbia, S. C., was recommended and received the appointment. The work which he did was so highly gratifying to the Sultan that upon the return of Doctor Davis in 1849 he reciprocated the courtesy of the President by presenting the doctor with nine Angora goats.

The Davis importation of Angoras was frequently exhibited at fairs, and everywhere attracted much attention and received favorable comments.

In 1853 the Davis goats were purchased by Col. Richard Peters, of Atlanta, Ga., with the exception of one owned by Col. Wade Hampton, of South Carolina, one by Mr. Davenport, of Virginia, and one by Mr. Osborn, of New York. Later Colonel Peters imported others, but they did not prove satisfactory. He is generally looked upon as the real founder of the Angora goat industry in the United States.

The Country Gentleman for January 29, 1860, refers to a "recent" importation of 8 Angoras by Hon. William Henry Stiles, of Cartersville, Ga.; the exact date of their arrival is not fixed. Col. J. Washington Watts says of them that they came "just before the war." He stated that they were "larger and stouter than the Davis goats, but inferior in fleece."

The following statement by Winthrop W. Chenery, of Belmont, near Boston, on the two importations of goats which he made, was published in the Massachusetts Ploughman in 1862:

> Two importations of these beautiful animals, purchased in Constantinople and consigned to planters in the South, have been landed upon the inhospitable shores of Massachusetts. The importations of the Angora, or Cashmere, goats, to which we refer, are at the Highland stock farm of Winthrop W. Chenery, of Belmont, near Boston.

The first of the two lots, consisting of 29 animals, was shipped at Constantinople on the 26th of March, 1861, and arrived at Boston on the 15th of May. The second lot, consisting of 41 head, left Constantinople on the 6th of October, 1861, and arrived here on the 25th of November.

Mr. Landrum states that further shipments of goats were made by Mr. Chenery, one of 20 head in 1866, another of 20 head in 1867, and that only about 30 of the 40 head arrived alive.

The Diehl and Brown importation of 160 Angoras was probably made during the year 1867. The Country Gentleman for December 12, 1867, says:

One hundred and sixty of these goats purchased by Israel S. Diehl recently arrived in this country and have been placed on the farm of C. S. Brown, of Newark, N. J.

Previous to the outbreak of the civil war there were many fair-sized flocks of Angoras in the South and Southwest, and there were smaller flocks in many of the Northern and Western States.

On account of the civil war little or no progress was made in the South, where the largest herds were located and where the most interest was manifested, until about 1866. Soon after the close of the war they spread out into the West, principally into Texas and California, where the natural conditions were most favorable and where they have increased in large numbers.

LATER IMPORTATIONS.

Mr. John S. Harris imported 2 bucks and 10 does, which arrived in Baltimore March 23, 1876, having cost $525 each landed in that city. An importation for which no positive date is fixed was made by C. W. Jenks, of Boston, and sold to Colonel Peters, and is noted in a Boston daily paper of January 31, 1880, which states that the steamer *Dorian*, from Constantinople, had arrived, having on board 3 goats for C. W. Jenks, of Boston.

On August 13, 1886, 2 bucks and 2 does arrived at New York from Delagoa Bay, consigned to E. A. Shults, for Fink & Co., of Leon Springs, Tex.

In 1893 C. P. Bailey imported 2 bucks from South Africa, and in 1899 another buck from Cape Town.

Previous to 1901 the last Angora goats that had been imported into the United States from Asia Minor were those imported by John S. Harris in 1876; and previous to 1901 he and Israel S. Diehl were the only importers who went into the vilayet of Angora for their goats. During the early part of 1901 Dr. W. C. Bailey, of the firm of C. P. Bailey & Sons, California, visited Asia Minor and was successful in securing 4 animals, and after many difficulties they were landed in New York and then shipped to California.

William M. Landrum, of Texas, who was the first to introduce Angora goats into California, succeeded in importing 2 yearling bucks from South Africa in 1901.

Mr. G. A. Hoerle, of New Jersey, visited South Africa in the interest of the Angora goat industry, and on May 29, 1904, landed at New York with 147 head of Angoras from Cape Colony.

E. L. Witt & Sons, of Texas, purchased a 4-year-old buck from O. Cawood, of Cape Colony, South Africa, in 1905. This buck, " White," took first prize at the Port Elizabeth show in 1904.

In 1901 South Africa passed a law, which is usually referred to as " the Angora export duty act, 1901." This act provides for an export duty of £100 ($486.65) on each Angora goat and each ostrich, and was to go into operation when the several governments of South Africa should agree upon a date. On September 20, 1904, Mozambique issued a decree ratifying the export duty. This was followed by a proclamation by the governor of Natal on December 13, 1904, providing that the law should go into effect January 1, 1905.

DESCRIPTION OF THE ANGORA GOAT.

Mr. Israel S. Diehl, bearing a commission from the Commissioner of Agriculture, visited the province of Angora in 1867 to investigate the mohair industry. Here, where there were once in operation 1,700 to 1,800 looms working up the mohair fleeces, he found but a few hundred remaining, struggling hopelessly against the fatal competition of European machinery and the aggressive policy of the European governments. The fleeces were exported to Europe for fabrication, thus rendering Turkey tributary to the monopoly then existing in this industry in Europe. The European demand for the raw material was so great and the facilities to fabricate it so much better and cheaper that Turkey was compelled to export the raw mohair. In order to meet the demands for manufactured mohair, the Turkish growers, without wise foresight, began the practice of crossing the Angora upon the common Kurd goat of that country.

These conditions have produced various types of Angoras, even in Asia Minor, and a minute description of one would not apply to all. Some strains have foxlike ears, while others and generally preferred ones have long pendent ears. In this country care must always be exercised to cull the off-colored kids out of the flock. These may be the result of atavism, where a cross was made upon a common goat, either red or black; but it is reported by some that different colors are found in the province of Angora among what were supposed to be purebred animals.

Mr. Schreiner, in his work previously mentioned, has compiled the descriptions of almost all writers on Angora goats. He quotes Mr.

Henry O. Binns, who spent twenty years in the mohair districts of Asia Minor between 1864 and 1886, and who studied them during that time, as follows:

The pure Angora in his prime is about the size of a five-months-old Cape [Cape of Good Hope] kid, with small thin horns, wooled all over the body, their hair almost covering the eyes; exceedingly delicate, and so subject to disease that no one cared to keep him. What is to-day called the purebred Angora is like the English thoroughbred horse—the result of crossing and recrossing until body, class, points, etc., have attained to what is generally considered that the thoroughbred Angora ought to be.

FIG. 1.—Angora buck "Prosperity," showing mohair 19 inches long.

The opinion of Mr. Schreiner, the South African authority, of a purebred Angora is as follows:

I think it is certain that the original purebred white mohair goat was a small, very refined, delicate animal, of great beauty, clipping at twelve months' growth of fleece about from 2 to 4 pounds (according to age and sex—kids considerably less) of dazzling white, fine, soft, silky, very lustrous mohair, curling in ringlets from 10 to 18 inches long, with merely the minimum of oil in its fleece requisite to the growth of hair of the highest excellence, so small in amount as to be inappreciable to the unskilled observer. It was perfectly clothed in every part; it had short, silky, curly hair about the face and down the lower parts of the legs to the hoofs; a soft, silky, curly "kuif" (tuft on the forehead), and small, thin, light-colored horns. The ewe was of course smaller and finer than the ram, and had only one kid at a birth (of this there is abundant evidence).

Mr. Diehl mentions a variety of this goat in Angora which was hornless. There is reason to believe that an intelligent system of breeding would produce such result.

A few years ago, before much effort had been made to improve the Angora goat, it was described as a little animal; but under favorable conditions its size has been greatly improved, although it is yet considerably smaller than the average sheep. The future may cause a change of opinion as to the weight that is desirable, but at this time it is believed that the aim should be to produce animals weighing at maturity from 60 to 100 pounds.

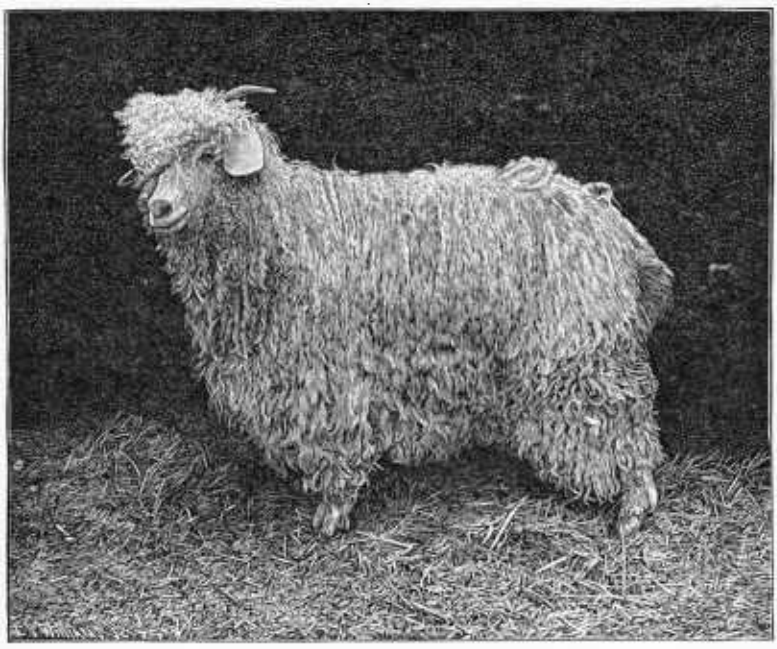

FIG. 2.—Angora doe "Princess Monterey," 10 months old. Fleece 4½ pounds.

Males and females alike have horns and beards, except that in rare instances an animal without horns may be seen. The horns of the male grow to a length of 18 to 20 inches and turn upward, outward, with a backward twist, while those of the female, which grow to a length of 8 to 10 inches, grow upward and point backward with only a slight inclination to twist.

The body should be round and broad throughout its length; hips and shoulders of equal height, as low shoulders indicate a delicate constitution; hips not sloping in a pronounced degree; chest broad; legs short. The head should be broad, with a wide muzzle and bright eyes; ears may be partially upright or distinctly pendent.

The fleece should cover all parts of the body except the inside of the upper part of the legs. While some animals show mohair down the legs to the feet, this does not indicate a better individual than may be found among those that have no mohair below the knees and hocks. It does indicate, however, a strain producing a heavier fleece. The fleece should make an annual growth of not less than 8 to 10 inches and be so dense upon the animal as to yield from 4 to 6 pounds. The ringlets should be well formed from point to skin, and the tighter these ringlets are twisted the better; loose, slightly wavy hair is objectionable and indicates coarseness and brittleness, and often lacks luster. It is of the utmost importance that the hair be extremely fine—the finer the more valuable. The ideal Angora should be free from kemp. No other thing tends so surely to reduce the value of the fleece as the presence of kemp; and the more kemp there is present the less valuable the fleece, no matter how fine the mohair may be.

A characteristic of the common goat that is very objectionable is the ever-present offensive odor from the bucks; in the Angora breed this odor is entirely absent, except at the rutting season, and then it is noted in a slight degree only. The odor in a fleece of mohair is milder than that in a wool fleece, and is not at all offensive.

NAMES OF THE SEXES.

Previous to the appearance of Bulletin 27 of the Bureau of Animal Industry, entitled "Information concerning the Angora Goat," there were no well-established names for designating the sexes of the goats. The male was indiscriminately called "male," "sire," "buck," "ram," and "billy," and the female "doe," "ewe," and "nanny." Often a writer uses two or more of them in one article, showing that he had not adopted any of them. An investigation developed the fact that the terms "buck" and "doe" were preferable, and these, being used in the bulletin mentioned, have generally been adopted by breeders everywhere. The castrated animal is called "wether," as with sheep. The young is called the "kid."

USES OF ANGORA GOATS.

A large number of people in some way have become possessed of that opinion that the goat is practically a useless animal. Not only do investigations prove that the Angora goats are classed among the most useful of the domestic animals, and have been so classed for thousands of years, but their usefulness is manifested in a variety of ways. The fleece, called "mohair," furnishes some of the finest of fabrics among ladies' goods and is used extensively in the manufacture of plushes and in various other manufactures which will be mentioned later on; their habit of browsing enables the farmer in a

wooded locality to use them in clearing the land; their flesh is exceedingly delicate and nutritious; the milk, though not so abundant as with the milch breeds of goats, is richer than cow's milk; their tanned skins, though inferior in quality to the skins of the common goat, are used for leather; their pelts make the neatest of rugs and robes; they are excellent pets; a few of them in a flock of sheep are a protection from dogs; their manure is noticeably helpful to the grass which follows them after they have cleared away the underbrush. These are all subjects of varying degrees of importance, and most of them will be considered under appropriate heads.

BROWSING AND PASTURAGE.

CLEARING BRUSH LAND.

Goats are browsers by nature, and there is no vegetation they will eat in preference to leaves and twigs of bushes. While this fact

FIG. 3.—Brush land "before goating."

would at once establish them as an intolerable nuisance in an orchard or garden or any other place where desirable shrubbery is growing,

it also shows that they may be of great value in many localities where it is desirable that underbrush be destroyed. Every leaf and every twig within their reach is greedily eaten, even to most of the bushes and weeds that are considered poisonous to other ruminants, while a remarkably few weeds are passed by.

The inherent tendency to climb leads them to hillsides and rocky cliffs, and they prefer such situations to any of a level character. Here nature meets their necessities by dwarfing the bushes so that they may be browsed easily; the soil is quickly drained in the event of rain, for they do not like wet land, and the stones serve to keep the feet trimmed properly by the wearing process. This is the situation that the goats would choose, but the farmer might choose to turn

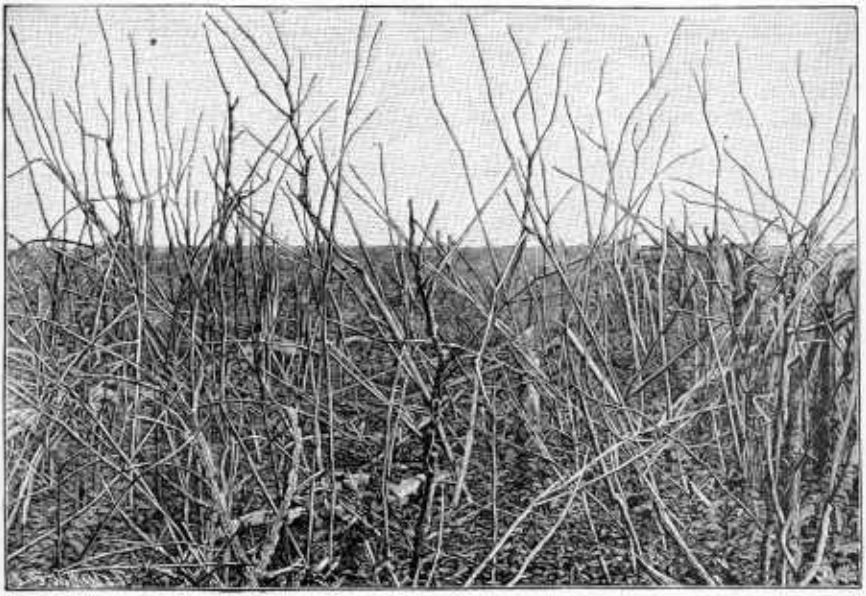

FIG. 4.—Brush land "during goating," after twelve months.

them into a dense mass of brush and weeds anywhere and they will at once begin to convert it into the most beautiful pasture.

In their efforts to get at the leaves and twigs the goats will stand on their hind legs and strip the saplings to a height of 5 or 6 feet.

Why the value of goats as brushwood destroyers was not recognized years ago it is difficult to say. Dr. J. R. Standley, of Iowa, is supposed to be the discoverer of this economic use of goats. An article in a consular report on the propensity of milch goats for destroying brush and scrub attracted his attention, and he at once saw that the characteristic which made the goat a nuisance abroad could be put to beneficial use upon his own tract of land, which was useless on account of its dense growth of underbrush. Doctor Standley at once secured

a carload of Angoras and turned them upon his land with the most gratifying results. His opinion of goats as brushwood destroyers is given herewith:

Land can be cleared of the worst brush known to this country for a little less than nothing by Angora goats. Some one asks how. Simply this: Angora goats will pay a profit and live on leaves and weeds, leaving the land cleaner and nicer than can be done in any other way. Many persons have the idea that goats bark the trees and in that way kill them. They also think that goats wholly eat the hazel and other small brush. There is nothing in this. Goats are no worse to bark trees of any kind than sheep. The way in which goats kill brush is by continually cropping the leaves, which serve as the lungs of the brush. The continued cropping of the leaves makes the brush, as it were, sick, caused by lack of nourishment. This sickness sinks to the very extremity of the roots, thus preventing sprouting. Any and all kinds of brush are in this way easily killed. Some kinds of brush and some kinds of stumps are of course much harder to kill than others. Many varieties are entirely killed by one summer's trimming of the leaves. Almost any are killed by two years' trimming. To clear the worst brush do not cut anything that the goats can reach or bend. The tallest or largest is better not cut. All trees and saplings should be cut, and the goats will keep all the sprouts down. If stumps are allowed to sprout one year before the goats are turned in, the sprouts need not be cut. About 200 goats for 40 acres of brush will in two or three years make the land as clean as a garden. If the pasture has only patches of brush, turn in a few goats and it will make more grass for other stock than if the goats were not in. They eat very little grass when they can get leaves. Goats even like weeds better than grass. In clearing brush land in the old way by grub and plow there are always left many eyesores in the way of brushy nooks and bends and steep places which can not be plowed.

There are millions of acres of land in nearly every State in the Union which might be much more than doubled in value by the use of Angora goats at no cost at all. Commence and count the worth of your land, then the fencing, and see if you can afford to leave your brush land so nearly worthless for all time. Then count the cost of grubbing and plowing, if indeed such land is susceptible to the plow. No man can afford to grub and plow brush land in this day and age of the world any more than he can afford to plant a large field of corn without a planter. In hilly or mountainous portions of the country the Angora goat can be made to do a great service in the way of clearing the underbrush, when the land will bring grass after the brush is gone. It would surely be a paying business to buy up large tracts of rough land in the mountain districts, or indeed any brush land in the United States, and clear the brush and set in grass. Afterwards, if the owner liked other stock better, he might dispense with the Angoras. In many places where the country is too bare to furnish sheep with sufficient feed goats will do exceedingly well. In many places where leaves are abundant and there is scarcely any grass, making it impossible to profitably keep sheep, goats will do admirably well.

Upon the recommendation of Doctor Standley, based upon his experience, thousands of goats were taken into Iowa for clearing brush land some time before they were seriously considered elsewhere.

Doctor Standley's experience is but that of many others, and testimonies of the goat's ability as a brushwood destroyer have come from

all parts of the country. There is no doubt that the question of brushwood is a serious one in many sections of the United States, there being millions of acres of land covered with brush, ferns, and briers, thus being practically useless for pasturing. There seems to be no more economical way for clearing up this land than by the use of the goat.

In localities where valuable land is completely overgrown by brushwood the goats are considered of more value for the purpose of clearing it than for their mohair and meat. Their value in this respect must be measured by the value of the land which they render cultivable.

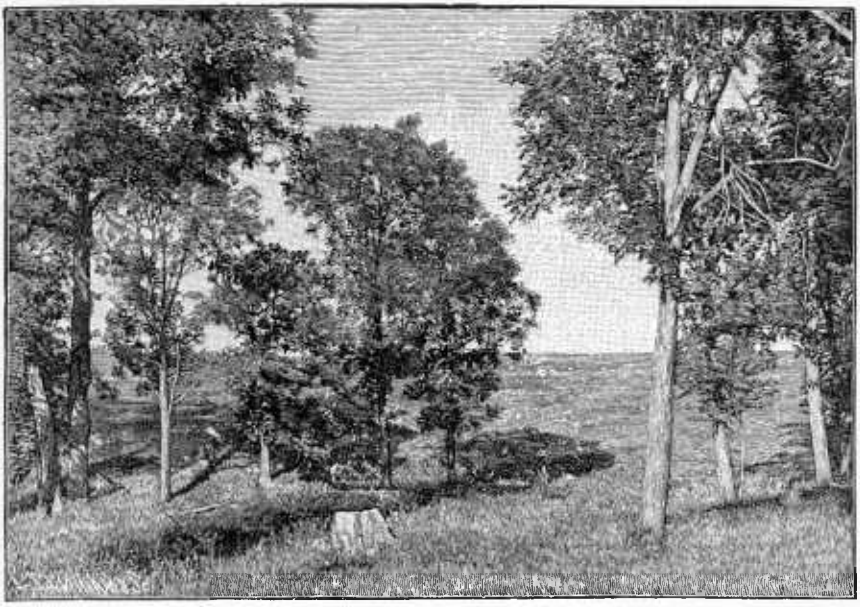

FIG. 5.—Brush land "after goating" two years.

If the saplings are too large for the goats to manage, they may be cut down, so that the animals may get at the leaves and twigs at the tops.

As brush must be subdued continuously for two or three years to kill the roots, it is necessary to keep the goats on it for more than one season. Most shrubs will start anew from the roots, and if the land is to be converted into pasture or cultivated the goats should have the run of the wood lot for at least a part of the time for two or three years. In this time a large amount of the richest kind of manure will have been deposited on the land, which aids the grass in its growth.

Almost every kind of vegetation is relished by goats. They are not fond of hickory, alder, and pine, but have been known to eat them

greedily at times. In Maryland and Virginia there is a great deal of broom sedge, which will not be touched by other live stock, but goats consider it a favorite feed.

The fact must not be overlooked that the brush-destroying habit is common to all kinds of goats. The common goats will do the work as well as the Angoras. The latter are employed for the purpose because they are more plentiful and because there is profit in their progeny for breeding purposes, their mohair, and their meat.

OTHER ADVANTAGES OF BROWSING.

The browsing habit of goats is important in connection with the question of feeding. In some places they obtain enough browse to carry them through the winter. This is especially true in the Southwest, where there is so great an abundance of live oak. If snow is on the ground, or if for other reasons the goats are deprived of opportunities for foraging, the trees are cut down for them. They pass through the winter in good condition without other feed. Wherever they are deprived of opportunities for browsing, they must be fed. Browsing saves feed. As far north as Nevada goats subsist the winter through on sagebrush.

Some persons claim that the animals make a better growth among the bushes than on open pastures, and that the quality of the fleece is much better.

Many correspondents state that it is the browsing of the Angora that gives to the meat the game flavor, thus leading some to name the meat "Angora venison." It is also stated that when deprived of browse and fed on grass and grain the game flavor disappears.

PRESERVING BRUSH LAND FOR BROWSING.

Up to this point consideration has been given to these goats as a means of clearing land for pasture or for cultivation. There is much brush land in the United States which will support goats, but is good for nothing else. If this is to be devoted to goat raising, it is, of course, not desirable that the brush be entirely exterminated. In this event a goat raiser should have several fenced areas and change the goats from one to the other frequently. They should not be permitted to denude entirely one field before they are transferred to another. It is true, however, that no matter how perfectly a woodland may be cleared of brush it will be covered over again with briers and brush in a few years if constant attention is not given it. It is not difficult to overpasture such land, and if the goats adopt the "peeling" practice the brush and trees will have greater difficulty in recovering.

OBJECTIONS TO SOME BRUSHWOOD.

The statement has been reiterated over and over by the newspapers, in mentioning the spread of the Angora goat industry, that these goats will eat all kinds of poisonous plants without any harmful results. While there is much evidence pointing to this conclusion, it ought not to be taken as a settled fact. If experiments were undertaken it might be shown that a plant which is poisonous to sheep or cattle is also injurious to goats. It is observed that goats feed upon brushwood by snipping off a leaf here and there—from a pine here and a cedar there, a grass blade here and a weed top there, and so on; they do not, like the sheep or cow, eat a weed entirely or strip a bush clean before passing on. The result is that the goat's stomach is filled with a great variety of food and not much of any one kind. If by chance a few poisonous leaves are eaten, they are probably neutralized by the large quantity of other food eaten.

Upon a farm in Pennsylvania there was a patch of laurel where goats had passed it by during the whole season. This was evidence that they knew it was not good for them. Later in the season several hundred goats were turned into that same pasture after a long journey and when they were very hungry. The laurel patch was the only green food in sight and they ate of it greedily. The next morning found 300 of them very sick and 50 dead. What had proved harmless to the goats that had been there when there was an abundance of other feed proved exceedingly poisonous to the hungry newcomers.

While it is possible that goats may not eat laurel to such an extent as to be injurious if placed in a pasture where it is growing with other browse, it can not be considered a safe practice. The laurel best known is the narrow-leaf variety (*Kalmia angustifolia*). According to V. K. Chesnut[a] this species "is abundant in the northeastern section of the United States, where it is also known as sheep laurel and lambkill. The leaves contain andromedotoxin, and sheep and calves are quite frequently poisoned by eating them."

The greenbrier, which appears to have a wide distribution in the United States, is an enemy to goat raising; not that it is poisonous, but because of its physical character. It is a climbing shrub, very wiry, and well covered with very hard and tenacious thorns. They grow in clumps and to great length, and preferably on lowland near creeks or ponds. It is a very easy matter for these thorns to catch in the fleece and hold the animal fast until it dies. No goat has strength sufficient to break the shrub, and the thorns do not give way. These shrubs should be cut down with a brush scythe and burned before goats are permitted to go among them. Where goats have had access

[a] Fifteenth Annual Report, Bureau of Animal Industry, 1898, p. 141.

to greenbriers immediately after shearing, when there is no fleece to catch upon the thorns, they have destroyed the briers by eating the leaves and by girdling.

It must be understood that goats can not do very much toward destroying trees after they have reached the sapling stage of growth.

GOATS AS GRAZERS.

While it is true that goats are browsers by nature, they will subsist nicely on grass. Several successful breeders believe that goats fed on grass will produce a finer and heavier fleece of mohair, with less wax and gum, and that it will have more luster than if the animal feeds on browse.

Considerable interest has been manifested in the Angora industry in those localities where browse is not available and where grass and weeds form the only pasturage. A great many inquiries of this character have come to the Bureau, and the Bureau, in turn, has referred the matter to the breeders of the country. The replies received have been numerous, and show a difference of opinion. The predominant opinion, however, seems to be that the goats thrive best under the conditions most nearly like those of their original home. It is certainly the best argument to say that goats prefer any kind of browse to the most nutritious of grasses, which is true, and therefore browse is better for them than grass. While the more economical conditions obtain where there is an abundance of browse, it is not definitely settled that the goats will not thrive well on common pasture grasses. It is the opinion of the writer that this question is still an open one, as some successful breeders have had goats on the grass range for thirty years.

There is always expense in connection with pasture grasses, but there is little or none with browse. One of the chief reasons why goats are receiving so much consideration at this time is that they are practically inexpensive feeders, and so all items of expense must be figured on if profit is to result. Pasturage, unlike browse, is not available all the year through. Therefore in prairie locations feeding in winter is a necessity.

PASTURING WITH OTHER STOCK.

So far as the goats themselves are concerned, they may be kept in the pastures where there are sheep, cattle, and horses. Their presence is in no way obnoxious to any of these animals. A few of them in a flock of sheep are a protection against dogs. However, it is not best for the goats that they be kept in pastures with horses. This is

especially important if there are kids, as the horses have a habit of playfully chasing any animal that is not large enough to defend itself, and they are apt to strike the kids.

NUMBER OF GOATS TO AN ACRE.

Questions are frequently asked with reference to the number of goats to an acre. The number will depend, first, upon the object in pasturing on brush land, whether it is to kill the brush or to use it as a permanent pasture for the goats; and, second, upon the quantity of feed obtainable.

MOHAIR.

DESCRIPTION.

The word "mohair" is the technical and commercial name for the fleece of the Angora goat, which is used in the manufacture of fabrics. The word comes to us, through the old French "mohere," from the Arabic "mukhayyar," meaning goat's-hair cloth.

The fleece upon the goat is pure white, is exceedingly lustrous, and grows to an average length of 10 inches annually. It hangs in beautiful wavy curls, or ringlets, from all parts of the body, if the animal is of the best breeding. The average annual production of mohair is about 4 pounds a head. The grade of the goat has much to do with the weight of the fleece. The first cross of an Angora buck upon a common doe gives but a small amount of mohair, but the increase in quantity is noticeable as the crosses become higher.

Mr. C. P. Bailey states as follows:

> Half-breed goats scarcely shear enough to pay for the shearing; three-fourths-bred goats shear 1 to 1½ pounds, worth 15 to 20 cents; seven-eighths-bred goats shear 2 to 3 pounds, worth 20 to 30 cents; fifteen-sixteenths-bred goats shear 3 to 5 pounds, worth 30 to 40 cents.

All mohair has a luster peculiarly its own, but this is much more pronounced in some fleeces than in others. That having the higher luster, other qualities being equal, commands the better price. A fleece of low luster indicates a goat under influence of adverse conditions—as poor breeding, poor feeding, or sickness. The uninformed often express the opinion that this luster is due to oil in the fleece, but this is erroneous. Whatever oil there may be in mohair is inside the individual hairs, and not on the outside, as in the case of wool. A mohair fleece may be washed, then scoured, and then steamed, dyed, and worked up into fabrics after reaching the mills, but none of these processes removes any of the luster; indeed, all of them operate simply to intensify it.

The properties of this fiber which render it desirable are length, fineness, luster, strength, elasticity, and specific gravity, and these are relatively desirable in about the order given. There is no difficulty in securing length and strength, but the other properties must come by the most painstaking care by breeding. Having length, strength, and luster, the manufacturer wants the fiber as fine as can be bred. The length of the clip is the quality that gives to mohair its relative value. The manufacturers desire a long fiber, very fine, and strong. While there are uses for coarse grades of good length, the price is not so good as for the finer grades. The latter are used principally in the manufacture of plushes and the coarser grades in dress goods, coat linings, etc. The colder climates increase the fineness and add to the weight.

The following table, which is compiled from a "Report of examination of wools," etc., by Dr. William McMurtrie, and published by the Department of Agriculture in 1886, gives a very interesting comparison between length, fineness, strain, and stretch of mohair and commercial grades of wool:

A comparison of mohair and wool fibers.

Description.	Length.	Fineness.		Strain.		Stretch.	
	Inches.	*Centi-millime-ters.*	*Thou-sandths of inch.*	*Grams.*	*Grains.*	*Millime-ters.*	*Per cent.*
Mohair (average of 480 tests)..	6.91	3.157	1.2429	19.12	295.11	10.60	26.50
Commercial wools (average of 1,410 tests).....	2.62	2.118	.8352	7.01	108.79	5.02	25.11

It will be observed that mohair is not equal to wool in fineness, but in strain there is a difference much greater than would be suggested by the larger fiber. The average wool fiber in these tests stood a strain of 108.79 grains, while the average mohair fiber stood a strain of 295.11 grains. This is a difference of 186.32 grains—much more than double the strength of wool. It is to this strength of fiber that the great durability of mohair goods is ascribed. In stretching quality there is but a slight difference between mohair and wool. Doctor McMurtrie makes the point in discussing wools that the individual fibers may be variable in size, a condition brought about, it is supposed, by sudden changes in weather or feed, or by ill health.

CONDITIONS INFLUENCING QUALITY.

Feed and care have a great influence upon the weight and fineness of the fleece. If goats are exposed to sudden changes of weather the effect is shown in the fleece.

In some parts of the United States where the climate is dry and the soil is distinctly alkaline the natural yolk disappears from the mohair, leaving it dry, fetid, and harsh.

The fiber becomes coarser as an animal grows older. The best fiber grows upon goats of the best blood, and among these that upon kids, yearling wethers, and does, in the order named, is preferred.

The best fiber is usually very curly, or, rather, in ringlets, but not kinky. It loses its curl and becomes thinner, coarser, and straighter as the animal grows older.

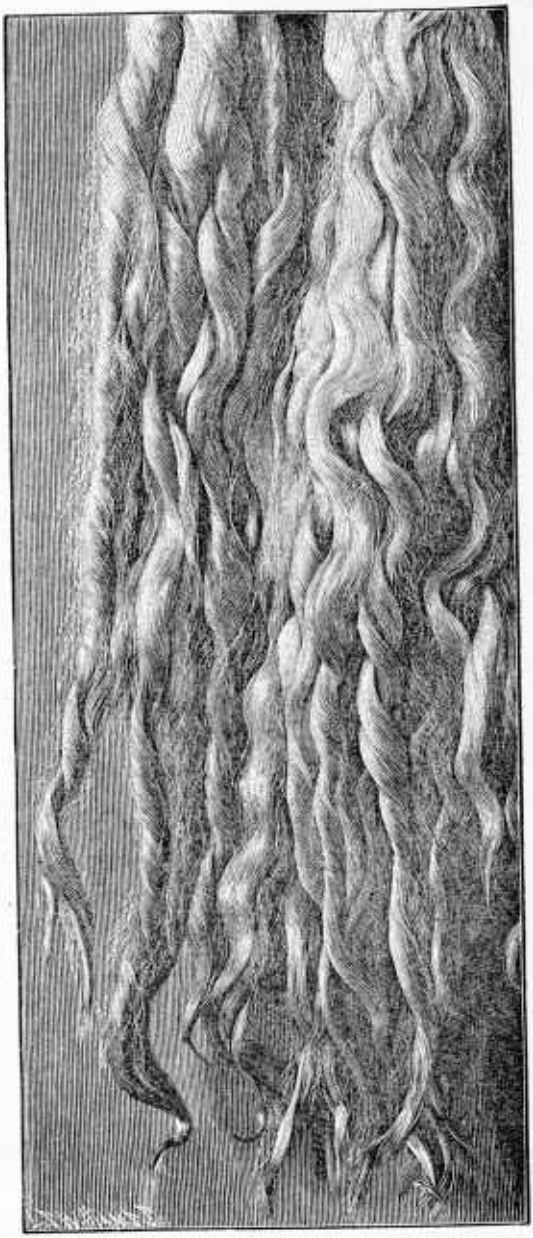

FIG. 6.—Samples of mohair.

WEIGHT AND LENGTH OF FLEECE.

The weight of the fleece is always a subject of inquiry, and is a difficult question to answer because of the controlling circumstances—such as climate, feed, care, and above all, the degree of Angora blood in the animal. At the present time the average weight of the fleece in the United States is from 3 to 5 pounds and the length about 8 inches. There are, of course, individual goats of high breeding that will shear 8 to 12 pounds and carry a fleece 12 to 18 inches long. In the southern part of the country, where shearing is done twice a year, the fiber is shorter.

SHEARING.

In Texas, New Mexico, Arizona, and sometimes in California, shearing is done twice a year—in the months of March or April and in September or October. The reasons are that, owing to the warm climate, the fleece will often shed in the fall if not clipped. There are instances in these localities where goats carry their fleece through the year; but all breeders, except in some parts of California, report the practice of shearing twice a year. In other parts of the country shearing is done but once a year, and that in the months of March or April. The rule for shearing time does not depend so much upon the calendar as upon the condition of the fleece. It should not be delayed until the fiber begins to shed, as then the oil will begin to go back into the body of the animal, the mohair thus losing its life and luster.

As to the relative values of the semiannual and annual fleeces, there does not seem to be much difference of opinion. The semiannual fiber is shorter and therefore less desirable for fabricating, and the price is not so high as for that of the annual fleece. It is generally agreed that the two shearings combined weigh a little more than the annual shearing, but probably the increase does not average more than a quarter of a pound. However, some who have practiced it report that the gain is not equal to the cost of the second shearing, and that shearing twice a year is done from necessity rather than from the standpoint of profit.

It is well to bear in mind that the mohair manufacturers prefer long hair, above 6 inches, and that they have not yet been able to secure all this staple they need.

The use of shearing machines, largely employed among sheep raisers, is coming more and more into general use among goat raisers. The machines are more rapid than hand work, and the results are more satisfactory. The cutting of the skin is easily avoided in reasonably careful hands, while it requires extreme care with hand shears to prevent cutting.

Of course the goat raiser will consider the relative cost of shearing with machines and by hand before he will purchase a machine. The decision will probably depend upon the number of goats. The cost of shearing is about 4 cents a head in the South and from 7 to 10 cents in the North. In the Southwest there are Mexicans who follow the profession of shearing sheep and goats; these usually receive 2 cents a head, with their board. Many of them will shear 85 or 90 a day, the average of all being about 60. Any man who can shear sheep can shear goats. If shearing is done by hand, a short-bladed shear should be used in order to avoid cutting the hair twice. Another objection to hand shearing is that there is often double cutting

of the hair. The result is a shortening of the fiber and an increased amount of noilage.

Goats are not so gentle in the hands of the shearer as sheep, and many men, especially beginners in the industry, are anxious to know how best to handle them during the operation of shearing.

The late F. W. Ludlow, of Lake Valley, N. Mex., devised a shearing table which has proved to be of great service. It is a collapsible trough, or combination table and trough.

Mr. Ludlow's description of this table is given herewith:

The table is simple in construction. It is about 22 inches high, 2 feet 10 inches long, and 21 inches wide. The top is composed of two 9-inch sides, which are hinged to the 3-inch centerpiece. On the lower side of these movable flaps is a narrow piece 8 inches long, which catches on the framework of the table

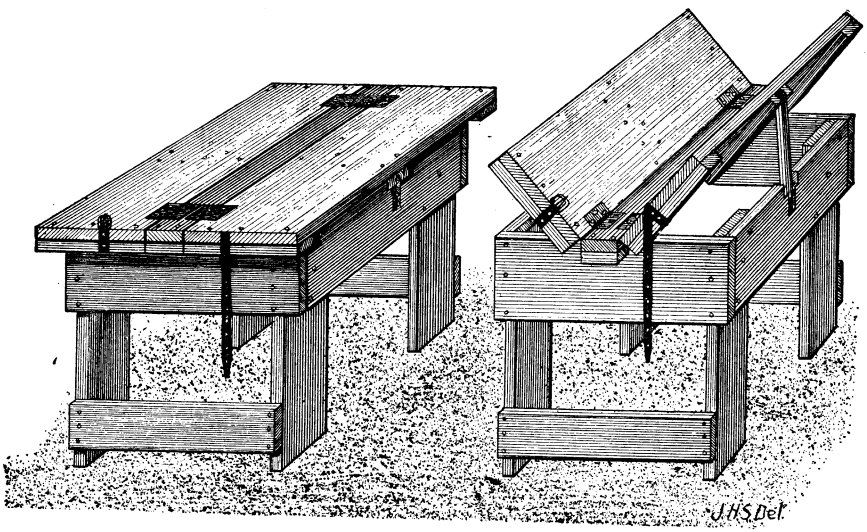

FIG. 7—Combination shearing trough and table.

when the sides are lifted and holds them stationary. When the sides are elevated, the top of the table forms a trough 3 inches wide at the bottom and possibly a foot wide at the top. Into this trough the goat to be shorn is thrown feet up. A small strap, which hangs from the end of one of the sides, is run over the goat's neck and fastened to the other side. The goat's head is hanging over the end of the table and the strap prevents it getting free. The belly and legs are then shorn. The legs of the goat are then tied together, the strap removed from the neck, and the sides of the table dropped, so that one has a plane surface on which to shear the rest of the animal. An untrained man can shear 100 goats a day with a shearing machine and such a table.

SHEDDING.

There are a few breeders who maintain that purebred Angoras would not shed their fleeces under natural conditions; there are

others who claim that they would shed biennially; others maintain that the matter of shedding and nonshedding is a question of feed and care, and still others claim that it is perfectly natural for the Angora to drop his fleece annually.

As a rule, Angora goats, like sheep, shed their fleeces annually as soon as the warm spring weather sets in. In the Southern States it is found that they will shed twice a year, and it is for this reason that semiannual shearing is practiced.

CARE OF FLEECES.

It may not be known to goat breeders generally that the objection to any foreign fibers in mohair is the same as that which holds against kemp, namely, they will not take the mohair dyes. Therefore, if every particle of such foreign substance is not removed before going into the fabric, it shows in a prominent and unpleasant manner when the article is dyed, and necessarily cheapens it if it can not be burled out. For this reason mention is made here of the practice, quite general in this country, of tying fleeces with twine. In removing this twine at the mills it is almost impossible to prevent portions of it from adhering to the fleece, and it must be removed so far as possible by the most painstaking care. Fleeces from Turkey and Cape Colony are not tied, but simply rolled up inside out, and this is the condition in which the mills desire to receive them.

Few goat breeders wash their goats before shearing, and if the animals have been well cared for during the winter and early spring washing is not necessary. The mohair manufacturers will not pay as much for dirty fleeces, and the breeder will find it to his advantage to ship his mohair in as clean a condition as possible.

Colored fleeces, tag locks, mohair that is clotted, and that which is kempy and dirty should be packed separately.

As kid hair is usually the finest, it should be packed by itself; the doe hair and that from the wethers, if the hair is of about the same quality, may be packed together, and should be separated from coarser fleeces. The difference in price obtained for hair that has had this small attempt at sorting will be considerable and well worth the effort.

The operation of shearing should be done in a building free from straw and dirt, which might adhere to the fleece after it drops from the goat. The fleece should then be rolled up inside out and packed in the sack without being tied in any way.

The very short hair, mane, kemp, and the hair that has been cut twice in shearing are, together, called "noils," and this must all be combed out before the mohair can be spun. The noilage in Turkish

mohair is only 15 to 20 per cent. In our domestic product it runs as high as 40 per cent. Noils are worth from 20 to 25 cents a pound.

KEMP IN MOHAIR.

Besides the mohair there grows upon the Angora goat coarse, chalky white, stiff, straight hair, varying in length from half an inch to 4 inches, technically known as "kemp." It is generally believed that kemp is a relic of the common goat blood in the Angora, as it is a matter of history that the Angora flocks of the United States, as well as those of Asia Minor and South Africa, have been largely increased by crossing upon does of common blood. This argument seems plausible for two reasons: First, there is a certainty that there are no Angoras now in existence which are absolutely pure-bred, on account of crossing with common Kurd goats practiced many years ago by Turkish breeders; second, it is noticeable in building up a flock by crossing upon common goats that the kemp gradually grows less with each succeeding cross. That point has not yet been reached, however, where it can be said that a strain has been produced which has no kemp whatever, although a few breeders in this country and in South Africa appear to have very nearly reached that desirable result. This is the principal end to which breeders should lend their best efforts at this time.

The reason why kemp is objectionable is that it will not take the dyes used for mohair; the only effect of the dyes is slightly to discolor the kemp. There are dyes, it is true, which act upon kemp, but they have no effect upon mohair; and the best efforts put forth have not yet resulted in a mixture of dyes that will act satisfactorily upon both mohair and kemp at the same time.

Kemp appears in its worst phase in plushes, where every individual hair shows prominently. Its presence here is much more pronounced than when in the fleece, where it is nearly of the same color as the mohair. It is therefore of great importance that this objectionable substance should be removed from the fleeces. If any kemp should escape the eye and be woven into the plush fabric it would not be discovered until the fabric came from the dye, for it must be remembered that mohair plushes are woven "in the white," and afterwards (perhaps several months or a year) are dyed according to instructions to fill orders. Kemp, at this stage of the process, becomes an expensive proposition, for skillful hands must burl out every fiber of it as well as every other bit of foreign substance. In the cheaper plushes, such as are largely used in street cars, there is a considerable quantity of kemp. Much of this material may also be used without detriment in the manufacture of rugs.

The problem of the mohair manufacturer is the same as that of the mohair grower—how to get rid of kemp; and the burden of his meditations is to devise some sort of machinery that will do the work perfectly. American ingenuity has so far failed to invent such a machine, and so the manufacturer finds it necessary to call upon the breeder to produce mohair without kemp.

But the fact remains that the mills must get rid of kemp in some way, and the device which they use for the purpose is a machine which combs it out; but while the comb is removing the kemp it removes at the same time every mohair fiber of equal length with the kemp. This means that if the mohair going into this comb has kemp 3 inches long, all mohair fibers up to 3 inches in length must go out with it. The result is heavy loss. True, there is a use for this mixture of kemp and short mohair, as heretofore stated, in the manufacture of cheap goods, such as horse blankets and filling for carpets, and also for stuffing saddles.

DURABILITY.

The durability of mohair and mohair manufactures is well known to those who are familiar with their use. Statements which to some may seem incredible are on record, but there is no good reason to doubt their accuracy. Ladies who have worn mohair crepons and brilliantines are all aware of the wonderful durability of this fiber.

Strange as it may appear upon first thought, it is the durability of mohair dress goods that has prevented their more extensive use heretofore. The first cost being somewhat high, they have not generally been worn by people of limited means whose principal aim is durability in the purchase of clothing. They have been subject to the caprices of fashion, being " all the style " one year and " out of style " the next. This has naturally restricted their use largely to that class of people who could afford to discard them before wearing them out.

Even though the first cost of these goods may be high, their use would prove economical for that class of people who desire good quality and good appearance without affecting the highest degree of fashion. They will preserve their color to the last and the luster will never disappear.

PRICES.

Mohair prices have a wide range and are influenced to some extent by prevailing fashions. The demand for mohair of good quality has been steady and constant during the past few years, and so many staple articles are now manufactured from it that fleeces of good quality, clean, and uniform in length, find a ready sale. Mohair that is dirty, kempy, and short will bring as low as 7 cents a pound. Dur-

ing the last year (1905) fancy prices have been paid for mohair over 12 inches in length by manufacturers of specialties, such as wigs, flowers, hair nets, etc. The average price of mohair of one year's growth for 1904 and 1905 was 34 cents a pound.

The following instances are given of remarkable mohair yields and prices: Among the Angora goats exhibited at the Louisiana Purchase Exposition in October, 1904, were two goats which, because of the long fleeces that they carried, attracted more attention than any others of the prize winners. One of these was a doe owned by Mrs. M. Armer, of New Mexico; the other, Kingston Lad, was the property of Tom Wedgwood, also of New Mexico.

Mrs. Armer's doe sheared 14 pounds. The length of the staple is not stated, but the longest of it was about 18 inches. The mohair was sent to a purchaser in New York City who fixes his own price upon long mohair. He buys all he can find in this country and imports largely besides. He uses the hair in the manufacture of various things, such as wigs, switches, nets, ornaments, flowers, etc. The following was his payment to Mrs. Armer:

2 pounds, at $5	$10
7 pounds, at $4	28
5 pounds, at $1	5
Total	43

Mr. Wedgwood's buck sheared 16 pounds. Ten pounds of this he sold to the gentleman already referred to at $5 a pound. The owner says he gave away ringlets from the buck at St. Louis to the amount of 2 pounds at least. Most of the fleece was over 20 inches long.

In this connection it is interesting to note that a considerable number of persons in various parts of the country have sold whatever very long mohair they raised for very high prices—all of it to one man. For instance, William Riddell & Sons, of Oregon, sold 25 pounds for $42, as follows:

3 pounds, at $3	$9.00
5 pounds, at $2	10.00
15 pounds, at $1.50	22.50
2 pounds, at 25 cents (waste)	.50
Total	42.00

The Northern Angora Goat and Live Stock Company, of Montana, recently received from the dealer in long mohair $6.50 a pound for 42 pounds, a total of $273. This is the highest price on record and indicates that the mohair was remarkably long and fine.

It seems that there would be a limited demand for mohair for the purposes for which this very long staple is used. So long as there is a demand for a particular quality of mohair at such great prices the breeders will be wise if they endeavor to supply it.

MANUFACTURES.

The first striking feature of mohair manufactures is their great beauty. The luster of the hair, which is so pronounced even while it grows upon the goat, remains in the manufactured goods, and no amount of washing and no character of dye will remove it. It aids the dyes to show their colors more effectively and imparts to the goods the pleasing property of changing shades in shifting lights, which is a feature quite characteristic of silk goods.

A second feature of importance is that the dyes are usually fast, and however much such goods may be exposed to the elements they will not fade. In the best mills fugitive dyes are not used except when an order is received to match a sample which has been treated with such dyes; for a fugitive dye can not be matched by a fast one, nor can a fast dye serve for a fugitive one.

The durability of mohair goods has been discussed in connection with the durability of the fiber composing them. It is a characteristic that ought to make their use economical in many ways. This should be the case especially with dress goods and other wearing apparel.

Mohair manufactures already have a very extensive use, but they appear in the stores under so many trade names that only a few people, comparatively, know that they are the product of the Angora fleece. These manufactures are so varied and the fiber adapted to so many things which are now made of wool or cotton that no attempt will be made here to give a complete list of them, but a recital of some of the principal uses of mohair goods will be made in order that it may become generally known how extensive is their use at the present time, and some idea formed of the possibility of extending the use of mohair to other lines of manufacture.

By far the most important product of mohair manufacture is plushes. It is a fact not generally known that practically all of the plushes used in railroad passenger cars are made of mohair; so also are the plushes used in street cars.

Besides the car plushes, which are usually plain, large quantities of frieze and crush plushes are used in upholstering furniture. The designs for the frieze plushes are limited only by the ingenuity of man. The skill of the fabricator is so well developed that the threads forming the designs are in loops and of different color, yet the whole is woven at one time "in the white" and afterwards colored in the same dye. The crush plushes are very handsome, showing to best advantage the effects of varying lights upon solid colors. This kind is largely utilized in upholstering armchairs, but finds large use also in other kinds of furniture.

The carriage robes, couch covers, sofa-pillow covers, and rugs are distinguished by their high pile and rich coloring. The pile upon the carriage robes and sofa-pillow covers is about half an inch high. The robes sometimes have the pile on one side only, but many are made with the pile on both sides. The coloring is most exquisite, as is true of the sofa-pillow covers and couch covers. These colors are printed on by hand after the pieces are woven, and are rendered indelible by long steaming. Rugs necessarily require more modest coloring, but all the richness of subdued colors and luster remain to make them a distinctly beautiful as well as useful ornament. These goods can hardly fail to attract attention and advance in favor.

Most of the so-called astrakhan now in use is made of mohair. It has all the beauty of the real article, is much more durable, and will never change its shade in sunlight or air.

It would be very difficult to enumerate the many ways that mohair might be used in manufactures. Besides plushes, which form the principal item, there may be mentioned dress goods of various designs, coats and coat linings, table covers, etc., which are already on the market. There is a growing demand for it in cotton-seed oil manufacture as press cloths, because it stands the strain of pressing particularly well. A suggestion has recently been made that mohair could be manufactured into tent and sailcloth and rain coats, having as its qualifications durability, lightness in weight, and immunity from molding. Mohair cloth will not only turn water, but will hold water like a skin if the water is not beaten through it. Tent and sail cloths would necessarily be heavier and be even more effective in turning water. It is argued that the extra cost of this kind of cloth for these purposes is more than compensated for in the matter of durability and lightness of weight.

MARKETS, FACTORIES, IMPORTS, ETC.

There is a good market for all the mohair of the best quality that can be produced in this country. The demand for the best grade of mohair is far greater than the supply, as is shown by the fact that four of the leading mills purchased over a million pounds of imported mohair in 1907. There are more than a sufficient number of factories in this country to manufacture the product. These are all in the East, and the principal markets for mohair are New York and Boston. The marketing center of the world is Bradford, England, where practically all the product of Cape of Good Hope and Turkey is sold.

Some of the producers in the Northwest sell to commission men in Portland, while others sell in San Jose, Cal. A large amount of mohair used by the mills is purchased direct from the producers.

The proprietors of one of the leading mills stated recently that in 1907 they purchased about 90 per cent of their domestic mohair from the producers. Two other leading mill firms stated that they purchased, respectively, about 50 and 30 per cent direct from the producers.

The following table gives the quantity of domestic and imported mohair used by five leading mills in the United States in 1907:

Quantity of domestic and foreign mohair used in the United States by leading mills in 1907.

Mills.	Domestic.	Imported.
	Pounds	*Pounds.*
Sanford Mills, Sanford, Me	1,219,653	461,934
Cranston Worsted Mills, Bristol, R. I	38,000	.....
Massachusetts Mohair Plush Co., Lowell, Mass	600,000	839,000
Tingue Manufacturing Co., New York	350.955	11,150
Queensbury Mills, Worcester, Mass	453,880	50,184
Total	2,662,488	1,362,268

As shown by the following table, an enormous quantity of mohair is imported annually from Turkey and South Africa into the United Kingdom, from which center of the mohair trade Germany, France, Holland, Belgium, and our own country are purchasers.

Imports of mohair into the United Kingdom from British South Africa and Turkey, 1901 to 1907.

Year.	British South Africa.		Turkey.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
1901	10,615,948	$3,345,840	9,102,352	$3,032,204	19,718,300	$6,378,044
1902	18,241,579	5,288,090	11,518,629	3,634,390	29,760,208	8,922,480
1903	15,755,572	4,752,132	12,131,343	3,866,653	27,886,915	8.618,785
1904	13,984,345	4,327,457	10,809,928	3,377,137	24,794,273	7,704,594
1905	12,532,482	3,795,709	12,524,356	3,931,650	25,056,838	7,727,359
1906	15,704,894	4,748,905	10,508,221	3,299,589	26,213,115	8,048,494
1907	19,125,425	5,926,803	11,652,140	3,798,907	30,777,565	9,725,710

Judging from the official figures of the United Kingdom, the Turkish mohair brings a slightly higher price than the South African hair. This statement is corroborated by Mr. S. B. Hollings, an authority on the mohair trade of the world. From 1901 to 1905 the difference in price per pound was a little less than 2 cents, in favor of the Turkish hair.

The tariff act approved July 24, 1897, places a duty of 12 cents a pound upon mohair imported into the United States. Mohair cloth for buttons is taxed 10 per cent ad valorem. The duty on dressed and finished goatskins is 20 per cent ad valorem; on skins for morocco, tanned but unfinished, 10 per cent ad valorem. These rates are subject to increase under certain conditions of shipments.

THE MEAT.

There is a decided prejudice against the use of goat's meat among people who are ignorant of its qualities. The flesh of the Angora is exceedingly nutritious and palatable. The flesh of the kids is considered very fine. Breeders who pasture their goats upon grass as well as upon browse, and then fatten them with grain, produce a meat so nearly like the best lamb that it requires an expert to detect the difference. These people use the term "Angora mutton." In other instances, where goats are fattened by browse alone, there is a decided game flavor imparted to the meat, and under these conditions it is called "Angora venison."

In Cape Colony it is said that the old does are slaughtered to furnish meat for farm hands, and young wethers are sold to butchers in the town. In California many miners purchase Angora wethers in preference to sheep wethers for salting down for winter use, because, as they state, the Angora meat contains less fat, is more easily kept, and is just as palatable. In Arizona and New Mexico goat meat is used by many people.

The market for mutton goats has been much better during the past year than formerly, and this adds much encouragement to the Angora breeders. The edibility of goat meat is becoming more generally understood, and the use of this meat is increasing, as shown by the number of Angoras slaughtered annually at the principal markets, 58,183 having been handled in Kansas City alone in 1907. Kansas City is the leading market for mutton goats in this country, and most of the goats sold there are received from the Southwest. One of the leading commission companies handled over 17,000 head of Angoras in 1907, practically all from Texas, averaging 82 pounds, and selling as high as $5 per hundred pounds.

The meat of the Angora is sold as goat meat on the market and does not sell as high as mutton. Formerly goats passed as sheep and their meat was sold to consumers as mutton.

OTHER PRODUCTS AND USES.

SKINS.

The skin of the Angora is of a more delicate texture than that of the common goat, and consequently is not suitable for shoe leather. The Angora skin will not bring as high a price in the market as the common skin on this account.

The skins of the Angoras, if taken when the hair is about 4 inches long, make very handsome rugs. The hair retains its original luster, and may be used in the natural white or dyed any color desired. The

pure white ones are more generally preferred. There is a demand for Angora rugs in the United States which so far has not been supplied by domestic production. These rugs can be purchased at prices ranging from $4 to $8.

Another article of manufacture from the skins is the carriage robe, rivaling in beauty and durability the buffalo robe, which is no longer a factor in the market. The smaller skins of the does and wethers and the kid skins find a use as robes for baby carriages and are exceedingly attractive in their brilliant white.

These skins are used largely in the manufacture of children's muffs and as trimmings for coats and capes. They are also being used for men's coats and gloves. The finest kid fleeces adorn the collar and border of some of the ladies' opera cloaks. In the stores they are sold often under some peculiar name which does not inform the purchaser that they are ornamented with the hair of the Angora goat, and so thousands of such articles are worn by people who are unaware of the true name of their " furs."

Skins having fleeces are admitted free of duty, but a tariff rate of 12 cents a pound is placed on imported hair and a tariff of a varying schedule is placed upon manufactured mohair.

MILK.

The Angora is not primarily a milch goat, and is not often employed for that purpose. The information at hand indicates that the quantity of milk given by an Angora doe is uncertain, and only in exceptional cases does the amount approach that given by the established breeds of milch goats. Some of the records of the earlier importations of Angoras into the United States show that some of them were milked with success. It is stated upon the authority of some of the oldest breeders in the country that the likelihood of finding a good milch goat among Angora grades diminishes as the breeding of the goat is improved.

An analysis of goat's milk for the British Goat Society, with an analysis of cow's milk for comparison, is shown in the table below.

Comparison of analyses of goat's milk and cow's milk.

Element.	Goat's milk.	Cow's milk.
	Per cent.	*Per cent.*
Water	83.21	87.56
Butter fat	7.30	3.63
Casein	4.18	.....
Milk sugar	4.10	8.81
Ash	1.21	.....
Total	100	100

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The milk has an additional value in that the animal is practically immune to tuberculosis. Less than a dozen cases of tuberculosis in goats are recorded.

PROTECTION FOR SHEEP.

There is very little complaint heard from breeders of Angora goats concerning the ravages of dogs, while sheep raisers have always to recognize dogs as foes. Bucks can be trained to fight dogs, and thus be a protection to sheep. A few goats will stay with a flock of sheep, but if there are many of them they will be apt to separate themselves.

ANGORAS AS PETS.

The purebred Angoras are very graceful, and their beautiful shaped bodies and fine silky hair make them very attractive. As pets for children they are very popular, if they can be kept where they will be harmless to vegetation and anything made of cloth. They have all the propensities of the common goat for destroying fruit trees and chewing any kind of cloth and of climbing upon roofs. The Angoras are tractable and are often harnessed to carts, as are common goats, and their beauty makes them more desirable for this purpose.

ENRICHMENT OF LAND.

The droppings of sheep and goats are about equal in value as a fertilizer, and it is certain that the goat produces as much as the sheep. There is no better fertilizer for fruit trees and lawns than goat or sheep manure.

Mention has already been made of the value of the droppings of goats upon land that has been cleared of brushwood. If goats are kept upon land for a year or more, the benefit derived from the manure will be very considerable, not only upon land that has been cleared of brush, but also upon cleared land overgrown with weeds.

LOCALITIES ADAPTED TO ANGORA GOAT RAISING.

So far as temperature is concerned, no place has been found that is too hot or too cold for Angoras. Although not partial to heat, they will stand it quite as easily as sheep. Shade is essential to success if the sunshine is very warm.

The climate in Angora, where the breed originated and is still supposed to flourish in its most perfect state, is extreme. A temperature as high as 85° F. is registered in the summer and as low as 0° F. in the winter. In Cape of Good Hope, where they are thriving well, the

temperature goes higher in the summer, but not so low in the winter. The United States presents a wider range of temperature, where, in southern Texas and New Mexico, it may go above 100° F. in the summer, and in Idaho as low as 30° F. below zero in winter.

Almost any kind of soil, except wet and marshy land, is suitable for these goats. Their preference is mountainous or rocky land, where they find it necessary to climb mountain sides and rocky cliffs to browse. Such situations not only afford them satisfaction in climbing and feeding, but the rocks serve to keep the feet trimmed.

One of the reasons for the freedom of goats from most diseases is that they require pure water, and in no place is better water found than in the springs and rivulets of hilly or rocky localities. Goats also require much exercise, much more than sheep, and such situations satisfy the inclination.

Lowlands that are wet or marshy are not at all suitable. The effect of such situations soon makes itself apparent in a flock of goats. Foot rot is apt to give endless trouble, and the feet will need much attention in other respects. However, it must not be understood that rocks and hills are essential, although they provide for the goat an ideal situation.

The habits of goats, as set forth in the earlier paragraphs of this paper, suggest at once to the informed person that there are in the United States millions of acres of land suitable for goat culture which are now serving no economic purpose whatever. Much of this would answer for sheep raising, but much more of it is suitable for goats only.

There are many acres of farm land in this country covered with brush which are well adapted to Angora raising. The worn-out farms of New England furnish an excellent field for these animals, and at this time there are many small flocks of from three to fifty goats in that section exterminating the brush and fertilizing the soil.

In the South, where there is an increasing interest in live stock raising, there are many thousands of acres of rough mountainous land so densely covered with brush as to be of no practical use. Much of it if cleared would provide excellent pasture. Reports have come to this Bureau of a considerable number of Angoras that have been taken into the South and are doing well.

The " stumpage " districts of Michigan and Wisconsin, where there are great areas of land of the best soil covered with brush, would, if cleared, be converted into good pasturage for sheep and cattle. Large flocks of goats have been put upon much of this land and are clearing it, producing mohair, and enriching the soil.

Angoras have been tried in the Northwest with success. Some of the finest and best goats in the United States are raised in Oregon.

In Montana, Washington, and Idaho, where there is an abundance of available land, Angoras have been tried and have proved a successful venture. In Montana the grazing problem is receiving attention, and it is quite probable that the value of grazing land for goats will be considered in other Western States. While goats prefer brush and weeds, they will readily eat grass and thrive on it.

The largest flocks of the country are in the Southwest, principally in Texas and New Mexico. In this section there is a vast area well adapted to the industry. On account of the mildness of the climate, winter housing is unnecessary.

The Ozark region is also well adapted for Angoras, and reports indicate that a number of breeders of goats have taken advantage of these favorable conditions.

BUILDING UP A FLOCK.

It is assumed that whoever goes into the business of raising Angora goats does so for the production of mohair rather than of meat or skins, and so it is to his interest to have a flock that will yield a profit from the beginning. The best flock for this purpose is one composed of purebred animals. Such a flock will yield good mohair from the first.

Those who enter upon the business of goat raising, however, must make their operations conform to their capital, the same as in any other business. They will find that desirable does will cost from $8 to $15 each, and bucks all the way from $50 to $100 each; so that a large herd of this kind, although preferable, will cost a small fortune, and is beyond consideration by most people who will engage in the industry.

Another plan that may be pursued by one who has limited capital, but time and the patience to wait, is to begin with a few first-class animals and build up a flock from these. The result will be satisfactory, and the only drawback is the length of time required.

Many of the large flocks of Texas and New Mexico have had Mexican does for their foundation. Building up a good mohair-producing flock upon this plan requires five or six years. The advantages are that the does with which the beginning is made are cheap, costing from $1.50 to $2.50 per head. During the first and second crosses there are many twin kids, thus increasing the herd in that proportion—a condition not existing, except to a small extent, among purebred Angoras; the size and hardihood of the progeny are increased and the liability to disease decreased.

However wise the practice may have been, that method of building up a flock of fleece-bearing goats is now in vogue but slightly, if at

all. The practice flourished best when the goat raisers knew very little of the larger prices they might have obtained for a better grade of mohair. Care should be exercised in starting a flock by this method to select only such common does as are entirely white; any other color, however slight, is objectionable. In handling the crosses the breeder often finds that atavism becomes apparent when it is most objectionable. For instance, the progeny for two generations of a doe having black spots might appear all that is desirable, while the third generation would produce the latent color.

It is always quite necessary that the common does should be of the short-haired variety. Long-haired ones will give trouble in persisting to throw out long hairs among the mohair.

The buck used upon these does should be the best one can afford. The better the buck, the better the result. As the fleece upon the first cross is not worth more than the effort to clip it, the males among them should be castrated when about 2 weeks old and disposed of for meat as soon as old enough. The females among them, being half-blood Angoras, are kept for service with another purebred buck. The result of this second cross is three-quarter blood Angoras. The mohair from them has a marketable value, but is very limited in quantity and usually mostly kemp. It is best to deal with this cross in the same manner as with the first cross. If this method of procedure is followed up to the fifth or sixth cross, a flock will result that will produce most excellent mohair.

It has no doubt occurred to the reader that we now have four or five different grades of does, beginning with the common breed. Therefore, after a high-grade flock has once been produced in this manner, each year brings forth another one from the same sources, and this condition continues as long as the breeding life of the does continues.

While the foregoing paragraphs tell of crossing upon common stock, it is a practice that is not recommended and should be discouraged at this time. Breeders are doing their utmost to produce an animal that is free from kemp, and this method of crossing upon common stock works against that purpose.

MANAGEMENT OF A FLOCK.

AGE FOR BREEDING.

Goats of both sexes will sometimes breed when they are 5 months old, and often at 6 months, but from the fact that they are at this age but a month or two from weaning time and are not nearly full grown, it is obvious that they should not be permitted to breed. They reach

maturity when about 16 or 18 months old, and they ought not to breed before this time. If bred earlier the kids will not be so strong or so well developed. The goats are in their prime when from 2 to 6 years old, but with proper feeding in winter they have been known to breed regularly until 15 years old. The average life of goats, however, is about 12 years. There should be no tendency to keep does until they are very old unless they bring kids of exceptional merit, for it must be remembered that their mohair gets coarser, and consequently less valuable, as they grow older.

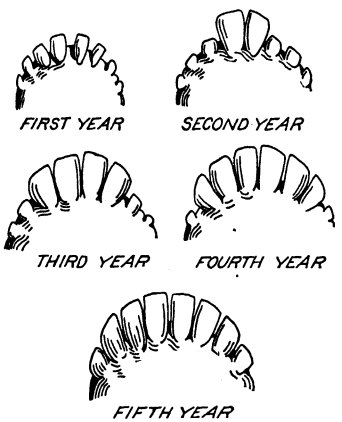

FIG. 8.—How teeth show the age of goats.

The accompanying illustration (fig. 8) shows how the age of goats may be determined until they are 4 years old. After that, in the absence of definite information, the age is a mere matter of guess, based upon the general appearance of the animal. The new teeth are longer and larger.

IN-AND-IN BREEDING.

In-and-in breeding means the breeding of related individuals. The term is indefinite, and with some refers to a close relationship and with others any degree of relationship. There is an overwhelming sentiment against the breeding of individuals of close relationship, because of the injurious effects upon the constitution of the progeny. It is quite generally agreed, however, that this practice will give a fleece of finest fiber, having a beautiful luster and little oil, but the weight will not be so great. Those who favor the practice contend that the quality more than offsets the quantity. Col. Richard Peters, the most successful breeder of his day, said that half-blood does can with best results be bred to their own sires, provided the sires have proved themselves to be good breeders.

MANAGEMENT OF THE BUCK.

Bucks usually come in heat about the middle of July and continue so about six months; does, however, do not usually come in heat until the latter part of August or the first of September. As the period of gestation in goats is from 147 to 155 days (or about five months), care must be taken in mating the animals in order to have the kids dropped in proper season, which will vary somewhat with the lo-

cality. The kids should not come before the warm days of spring, or when vegetation begins to put out vigorously. Therefore the buck should be put to service from November 1 to December 1, so that the kids will come about the 1st of April or May. The only objection to earlier kidding is the extra care required to preserve the life of the kids, for they are, like lambs, quite delicate for a few days, and exposure at this season should be avoided.

A buck, like any other domestic animal, should be in the best possible condition when put to service. He should be well fed with grain for a few weeks before this time, and the feeding should be kept up until a few weeks after his service is ended.

As to the number of does which a buck may serve, there is a great diversity of opinion. The greater number of goat raisers, however, think 40 or 50 are all that may be served with good results.

NUMBER OF KIDS.

Purebred Angora goats do not often drop more than one kid at a time, while the common goats nearly always drop two. There are many twins with the first cross, but the number diminishes as the crosses become higher. It is stated that the purebred Angoras never dropped but one at a time, and that the presence of twins in a flock is evidence of a base origin of the goats. The latter statement is disputed by some, who believe that the purebred Angora (having no trace whatever of base blood) will drop twins as regularly as the common goat. Good handling of a flock ought to give a kid for every doe, and there are instances of an increase of 120 per cent in a flock. In the Southwest, where the flocks are very large and on ranges, and where no particular care is given at kidding time, the percentage of kids is about 70.

KIDDING AND THE KIDS.

For two or three days after the kids are dropped they are naturally quite delicate, and there will be no future success unless good care is given at the time. They can not "rough it" at this period, though after a few weeks, when the kids are large enough to follow the flock, they will be able to care for themselves very well.

The proper time for kids to arrive is in the spring, about the time when leaves start on the trees and bushes. At that time there is milk-producing food for the doe, and the weather is also warm enough to favor the kids. The exact time may be governed, of course, by the service of the bucks, and will be earlier in localities where the seasons are earlier. If kidding comes in cold weather, there will be greater difficulty in saving the kids. Warm stabling must also be provided,

and the does will require extra feeding in order that they may supply milk for the kids.

A few days before a kid is due the doe should be separated from the flock. Some breeders would put her in a pen alone, while others would put as many as 20 in one pen. If the facilities are at hand, a small pen for each doe is better, for the reasons that the doe will sooner "own" the kid and there will be less danger of injury than if among a number. A doe knows her kid by the sense of smell, especially when it is young.

If kids are dropped on the range or in the pasture, they must be carried home and special care given to see that the does are made to own them, for many times they will refuse. A lamb will follow its mother very soon after it is dropped, but a doe will hide her kid as best she can in bushes, or behind a stone or log, and leave it there while she goes away to feed, and on her return she expects to find it where she left it.

The following is from "California Angoras," published by C. P. Bailey & Sons Company:

There are in use two methods of handling kids at kidding time—namely, the corral method and the staking method. Each of these has points which render it most valuable under certain conditions and in certain localities.

The Corral Method.

This method may be used with any number of goats. With various modifications and adaptations which best suit the size of the flock, the climatic conditions, the facilities for feeding, etc., it may be used by the beginner with success. We have practiced this method in Nevada for more than twenty-five years. If the herd is a large one, say 1,000 head, three men are required to handle the goats at kidding time. The service of the bucks is so managed that the kids will be dropped gradually through several weeks. At the height of the season we expect from 75 to 100 kids a day. The season lasts about thirty or forty days. Fortunately, most of the kids are dropped in the daytime.

We have four or five small corrals fenced with 36-inch woven wire and large enough to hold 50 does and their kids. The doe should be allowed plenty of room, because if too close to her neighbor she may adopt the other doe's kid. Besides these small corrals, two large ones are needed, each large enough to hold 1,000 does. Along the fence of one of these corrals are a dozen small pens just large enough to hold a doe and kid. At the gate of this large corral a jump board is placed. This jump board is intended to keep back those kids which are not large and strong enough to jump over it. A 2-inch board about 18 inches high will answer the purpose. Another device sometimes used is a platform open at the end, so that the kids may run under it, and thus avoid being trampled upon when the goats are going out over the platform.

The small corrals may be made of panel fence and located in a meadow where some feed is afforded. The does should always have some kind of feed at kidding time.

In the morning the flock is carefully examined, and all does which show signs of kidding during the day should be separated and placed in one of the

small corrals. The large flock is now turned out, and one of the men is sent with them, with instructions to take the herd at once as far as he intends to go for feed that day, and then to let them feed over a limited area and gradually work their way home. A few does will drop their kids on the range, and the herder should carefully note the number and their location. He should see that the herd does not feed around one of these does, as she is apt to leave her kid and join the band, thus necessitating much extra work in finding the kid and in giving it to its mother. Early in the afternoon the band is placed in one of the large corrals. Now, the herder and another man go out with a wagon or on foot and carry the kids home, gently driving the mothers. The kids should not be handled or rubbed against one another more than is necessary, as the doe knows her kid by the scent. These does and kids are placed in the small corral which contains the does held back in the morning with the expectation that they would kid during the day. We now have one day's kidding in one of the small corrals. The does and kids should be watched to see that they are properly arranged. Do not bother them more than is absolutely necessary. Do not be in a hurry to make a doe own a kid. Do not drive the goats around one of the small pens.

The does should remain with their kids in the corral for a day or two at least, or until the kids are properly mothered. Any does which have not kidded should be taken out. The next morning any kids which may have been born during the night are put in another small corral with their mothers, as well as the does which are expected to kid during the day. The procedure of the previous day is repeated. In about three days, if one has limited quarters, the first day's mothers and kids may be put in the second large corral—that is, the one with the jump board at the gate. Now this "wet" band is placed in charge of one of the men and sent out to feed. The gate is opened, the mothers passing out over the jump board, and the kids remain in the corral. The herder must not range his goats near the does that are kidding upon the range, and he should be cautioned to come in later than the "dry" band, so as to avoid any possibility of their mixing. When his band arrives at the corral, the gate is opened and each mother hunts for her kid. Some of the kids may not find their mothers, and if after a day or two there are a few unnourished kids and some does with overdistended udders they should be placed together in the small pens along the side of the corral. The doe will own the kid in a day or two whether she is its mother or not. The kids should not be allowed to become too weak before this is done. If one does not have enough small pens, a doe may be held while two or three kids suckle her, and thus tide them over until some of the small pens are vacant.

The next day the second day's kidding is added to the wet band. The wet band thus gradually grows, while the dry band decreases. During the day two men will be employed at herding the dry and wet bands, respectively, and the third man will be kept busy inspecting the kids, feeding the does in confinement, etc. If the weather is stormy, some of the kids will have to be sheltered. The advisability of having the kids dropped gradually through a period of thirty or forty days will readily be seen. If help is inexperienced, they may be gradually trained, or if the weather is stormy there will be time to get all things arranged properly.

The kids should not be allowed to go with their mothers until they are about 6 or 8 weeks old. If they go before this, they will probably become tired very soon and go to sleep. When they awake, the band will have gone and they are liable to be lost. During the day, while the mothers are feeding, the kids would eat a little grass if they could be herded near the corral.

As stated before, there may be many modifications of this method which will suggest themselves, but the above is a general outline of a method commonly in use.

The Staking Method.

This method is largely employed, even with large flocks, in New Mexico, but is possibly best suited to small flocks. It is without doubt the best method for certain surroundings. About the same amount of help will be required as with the corral method. There should be a good supply of stakes similar to tent stakes. There should also be a supply of swivel blocks which are about 4 inches long and having a hole bored near each end. A piece of rope about 6 inches long is fastened to the stake and the other end is passed through one of the holes in the swivel block and a knot tied in the end. Another piece of rope of equal length is likewise knotted and passed through the other hole of the swivel block, the loose end being tied to the kid's leg. Any swivel will take the place of this primitive method. The herder or owner can busy himself during the winter months by making stakes and swivels and by cutting and attaching the ropes.

When a kid is born it is taken to a convenient place to stake, and the mother is gently coaxed to follow. The stake is securely driven into the ground, and the kid fastened to it by the hind leg. The mother is left with the kid, in order that she may know where to find it upon returning from feeding. The kid should be staked where he can get plenty of sunshine, shade, and shelter. A small bush, a post, or a box will answer the purpose admirably. If there are twins, they must be so staked that they can suckle at the same time. The rope should be changed from one hind leg to the other occasionally to prevent unequal development. Sometimes a vigorous kid gets thoroughly tangled and requires help.

The kid may thus be left staked until he is old enough to go with the flock, which is after six or eight weeks, or he may be put in a corral after a few days, as is done in the corral method.

There are many successful breeders who use this method entirely. One may expect to get good results if he follows either the corral or staking method carefully.

There is very small loss among kids cared for as set forth above. Many of the breeders on a large scale report the percentage of increase as 100. This does not mean that every kid lives, but that so few die that the loss is offset by the number of twins that are dropped.

The most practicable fencing to be used at kidding time is made of portable panels. By the use of these panels a pen may be made large or small and be moved from one place to another without difficulty and with very little work.

Weaning.

Kids should not be weaned until they are $4\frac{1}{2}$ months old unless they are very strong, but they should not remain with their mothers after they are 5 months old. This especially applies to the buck kids, as they will often breed at 6 months of age or even younger.

Castration.

The buck kids not reserved for breeding purposes should be castrated when about two weeks old. The earlier it is done the better will be the meat and the mohair. It is pointed out in previous pages that the mohair from wethers ranks with that from the does, and the flesh is superior to that of the does and inferior only in small degree to that of the kids.

SIZE OF FLOCK.

All goat raisers agree that Angoras can not stand crowding together, and the higher the grade of the goats the more susceptible are they to injury from crowding. But to state just how many should be kept in a flock is difficult, as the number depends upon the character of their restraint. Where they have the range at day and large yards at night, the flocks may be very large, but where they have pastures and small pens at night the flocks must not be large. In the Southwest, flocks of from 500 to 1,000 are herded together.

Much stress should be laid upon the matter of overcrowding, as it is a more serious matter than is generally recognized. Goats will not stand what sheep do in this respect. They require much fresh air, and many persons who have taken their animals from the South to the North have done an injury to the flocks by providing barns that are too warm and that have not sufficient ventilation.

CARE OF A FLOCK.

The preceding pages have no doubt given the impression that Angora goats are very hardy, and, indeed, it is true, especially if their foundation is upon crosses with the common goat; but this should not be taken by the careless or shiftless man as a license to subject his goats to all manner of discomfort with the expectation that the results will be fully as satisfactory as if rational attention were given them. That these animals can withstand extreme cold, such as that of the islands of Alaska, or extreme heat, such as that of Guadalupe Island, is strong evidence of their fortitude and of their adaptability to a wide range of temperature under proper care. That they can subsist upon vegetation which is utterly useless for any other purpose is evidence simply of their economical keeping; it does not permit one to conclude that they never need any other kind of feed at times. In a word, it is intended here to impress the fact that, if satisfactory results are to be obtained in goat raising, the animals must receive the same rational treatment that is received by other live stock when best results are sought.

Information which has been received by the Bureau of Animal Industry through correspondence shows that the press, in its efforts to exploit the good features of these goats, has to some extent exaggerated the facts. It seems to be a favorite saying that "they live on nothing," and men who would not think of putting a horse, a cow, or a hog upon its own resources in a pasture in winter where the snow may be a foot deep have done so with their goats, and have wondered why they did not thrive. The goat will browse just as eagerly in the winter upon soft twigs as in the summer, but the twigs must be within his reach.

Goat men of experience leave all trees which the goats can not destroy in the summer until the winter and then cut them down. It is "a goat's paradise," as one correspondent states, to be in these tree tops. They will eat the soft part of the twig—2 to 4 inches. This is feed for goats—and good feed, too—although it is such as no other one of our domestic animals will subsist upon.

There is another feature of winter browsing which is of importance, and that is that the goats ought to enter the winter in good condition. If for any reason they can not get into good condition in the summer and fall, when there is so great an abundance and variety of brush and weeds, little can be expected of them in winter on feed less in quantity and variety. On every farm where goats are kept some sort of coarse fodder and grain should be provided in order that they may be available at times when storms will keep the goats under cover.

No amount of cold will prove injurious to the goats, but the caution may well be repeated that they should be kept dry, especially in cold weather. A shed of easy access that will turn water is one of the essentials of goat raising. It should be so constructed that the water will not drip from the eaves. It should not, however, be perfectly tight, so that the air can not have the freest circulation. Many goats will die from being too closely confined in warm sheds or barns before their owners will realize the fact.

HERDING AND FENCING.

Goats require a great amount of exercise, much more than sheep, The one is by nature a browser and the other a grazer, and the browsing habit naturally requires more activity on the part of the goats. They are sensitive to restraint and do better if not herded, but of course this is often a necessity, and therefore should be done under as favorable circumstances as possible. So far as possible they should not be allowed to feel their restraint. If constant attendance is necessary, the herder should be of quiet disposition. The next best thing to the freedom of a range is a large pasture, where the goats

may have oversight, but not constant attendance. Such pastures are considered the cheapest method of keeping these goats. They can easily be trained to come home by feeding a little and salting regularly at home.

The fencing for pastures is a matter which early concerns one who contemplates going into the business, for it is the current belief that goats will climb onto any shed of ordinary height or jump any fence that will stop other animals. While they will climb anything that is built in such a manner that it may be climbed easily, they will not jump any ordinary fence. They will, however, creep through if there is an opening large enough. The old-fashioned " worm " fence, especially if it leans outward, will not stop goats. The angles in such a fence are an incentive and a delight to them.

In building a goat fence there are other matters to be taken into account than simply that the goats shall be kept in; the animals themselves (especially the young ones) must be protected from dogs and wolves from the outside. In the Southwest it is much more important to fence to keep " varmints " out than it is to fence to keep the goats in. So the double object must be kept in view in building a goat fence. Such a fence must be dogproof, hogproof, and wolf-proof.

Fences made of any material may be suitable, but the manner of construction is the important feature. In order to convert brush land into pasture, a ten-strand barbed-wire fence, with posts set 16 feet apart and having two stays between, is a very good one. The lowest wire is only 1 inch from the ground, the next four wires 3¼ inches apart, and one-half inch is added to every space above the first below it. Taut wires are very necessary. Woven wire, although somewhat more expensive than barbed wire, makes a much more satisfactory fence. A good fence may be made of woven wire 3 feet high, drawn on the inside of the posts, and a closely barbed strand of wire 3 or 4 inches above fastened to the outside of the posts to prevent animals from jumping in. A straight rail fence, if the rails are laid close enough, as well as an ordinary board fence, will turn goats. A five-board panel fence 4 feet high is sufficient for goats.

SHELTER AND PENS.

A shelter is necessary during wet spells, and more especially if the rain is cold or in case of a sleet storm. Dry cold alone has little or no injurious effect after the kids are three or four weeks old, and they will even frolic in the snow when the mercury is at zero, and sleep with apparent comfort in an open shed. With their dense covering there is no reason why this should not be true; but this same dense covering, when soaked with cold water or driven full of sleet, is a

deadly menace. Goats will not get wet if they have an opportunity to avoid it. They appreciate a shelter and will always seek it at night, and during the day in the event of storms.

Goats should not be left on the range or in pasture overnight. The latter is practiced to a considerable extent, but experience has shown that they are safer in closer confinement during the nighttime.

The pens in which the goats are kept at night should, above all things, be in such a location that they can be kept dry by drainage. There is little use in raising Angoras for their fleeces if they are compelled to wade through mud and filth, or confined under these conditions. The fleece would soon become soiled and matted.

The sheds provided for their shelter must be of a size to give an abundance of room. The goats should not, under any circumstances, be crowded together. If they are thus crowded in cold weather they will pile up, with the result that some of the younger ones will die from suffocation.

Shelter from the sun's rays should be provided for summer time. Although goats are able to withstand intense heat, they do not thrive well when subjected to it.

FEEDING AND SALTING.

The principal reason why goats will be raised instead of sheep in some places is because they are practically inexpensive so far as feeding is concerned. This phase of the subject is quite fully discussed under the head of "Browsing and pasturage." They eat the leaves in summer and the soft twigs in winter, and if there is an abundance of either they will not require anything else to sustain life; but this condition exists only in certain localities, and other means must be adopted elsewhere. They are fond of straw and fodder of any kind.

Notwithstanding the ability of goats to subsist upon coarse fodder in the winter season, the impression must not be held that they will thrive well upon it in the absence of browse. They will extract from these fodders all the nourishment obtainable, which is not very great, but must receive some supplementary feed. Any kind of grain will answer this purpose. Probably the best feed is oats, and if it is sheaf oats better still. In Texas some of the large goat raisers feed cotton seed by scattering it upon the snow so that goats will have to exercise somewhat in picking it up; besides, the time consumed in picking up the seed thus scattered insures better mastication.

Cowpea stubble in the autumn, otherwise used for fertilizer only, has proved a satisfactory feed. Cowpea hay, clover hay, and alfalfa hay are all most excellent coarse feeds, and no grain is necessary with feed of this kind to carry the goats through the winter.

In feeding grain care must be taken not to make the supply too liberal, unless the object is to fatten for slaughter. Goats easily become lazy on a plentiful supply of grain and will decline to go out to feed upon the brush. This is an important point, as their hardiness to a large extent is attributed to their feeding upon browse and to the resulting exercise.

To keep goats in good condition the quantity of feed necessary varies according to climate. A fair average would be one-fourth pound of corn or its equivalent in other grains and 1¼ pounds of hay at a ration. If an abundance of winter pasture is available, this ration fed once a day, preferably in the evening, is sufficient. If such pasturage is scant, they should have it twice a day, and on wet, cold, days when kept all day in sheds it should be fed three times or their rations should be made considerably larger.

Sugar-beet pulp has been fed with success. The goats must be taught to eat it, but after once learning they seem not to be able to get enough.

Goats will not eat soiled feed, as they are very fastidious in the matter of cleanliness of feed, and they have no inclination to stand in mud or filth, much less to pick their feed from it.

A running stream in a pasture is valuable, but if this is not present good water from a spring or well should be afforded.

Goats require more salt than sheep, owing to the more astringent character of their food. If loose salt is used, the general custom is to give it once a week on regular days. If rock salt is used, it should be placed where the animals can get to it at any time. Rock salt is preferable, as it can be placed in boxes or troughs raised from the ground, and thus be kept out of the dirt and be of easy access to the goats at any time; and, too, there is no waste and no danger that the animal will eat too much of it.

MARKING.

Several devices for marking goats are in use, but the metal label in the ear is probably best known. A practice which appears to give satisfaction is to tattoo the numbers into the ear, using india ink. It is found that the metal label is sometimes pulled out by brush.

DISEASES AND ENEMIES.

Goats are less subject to disease than sheep; but these species are so closely allied that treatment in cases of disease is the same for both. Several accounts have been published in the agricultural press of goats in the Southwest being affected with stomach worms and with grub in the head, the same as sheep are affected in the same localities.

The treatment recommended for the screw worm is as follows: Add to any one of the carbolic sheep dips 10 per cent of chloroform. Apply this mixture, after thoroughly cleaning the wound, with a wad of cotton. The chloroform immediately destroys the larvæ and the carbolic dip prevents the further blowing of the wound.

The stomach worm (*Hæmonchus contortus*) is the same form as found in sheep, cattle, and deer. The treatment in all cases is the same as for sheep.

Goats have at least three kinds of scab parasites peculiar to their species, but apparently only two kinds of scab develop. Psoroptic scab of sheep does not develop disease upon them, though it can undoubtedly sustain life for a while.

Tapeworms of the genus Moniezia are found in goats. In the intestines are also found five roundworms, namely, *Nematodirus filicollis*, *Œsophagostomum venulosum*, *Strongylus hypostomus*, *Bunostomum trigonocephalum*, and *Trichuris affinis*.

Verminous pneumonia occurs in goats as well as in sheep.

Tuberculosis is rare in goats. Their freedom from this widespread and insidious disease is probably due to the feed and climate where the animals are found and to the exercise and fresh air obtained in roaming over the pastures. When confined in close quarters with cows that have tuberculosis, goats will also contract the disease; in other words, the goat's freedom from tuberculosis is due to environment rather than to a natural immunity.

Goats in good condition are not likely to be diseased or to contract disease, but there are some maladies which affect them if they are permitted to get into poor condition.

Takosis, the disease which played such havoc in a few flocks a few years ago, seems to have about run its course. The Bureau of Animal Industry took hold of the disease vigorously in 1902, and the advice given and the bulletin published have resulted in much benefit to the breeders.

Takosis is probably not of recent origin, for as early as 1876 reports of losses of goats from a disease whose symptoms closely resembled takosis were noted in the Country Gentleman.

The symptoms of takosis are somewhat similar to those accompanying a parasitic invasion of diarrhea and pneumonia. Listlessness and a languid appearance are the first to be noticed, with a slow, feeble pulse and an elevated temperature. Snuffling of the nose and occasional coughing are sometimes observed. The animals become very weak and are easily knocked down. The appetite is capricious, but rumination is seldom impaired. A fluid discharge of bad odor from the bowels is usually observed in the last days of life. The

visible mucous membranes are pale and anemic, and respiration is labored and rapid. In no instance has the natural recovery of an animal been seen when once the symptoms of takosis were noted. All affected animals should be isolated immediately upon the discovery of the symptoms and a strict quarantine should be maintained as long as the disease remains on the premises.

Good results have been obtained from the administration of 0.10 gram doses of calomel twice a day for two days, followed by powders composed of arsenious acid, 1.40 grams; iron reduced, 12 grams; quinine sulphate, 6 grams, made into twenty powders, giving one to each adult goat morning and evening after the calomel. After an interval of two days this treatment may be repeated.

Goats are apt to have foot rot, but a cure is easily effected by the use of sulphate of copper (blue vitriol). It is usually applied by driving the goats through a trough containing a solution of strong blue vitriol. The solution should be about an inch in depth. Oscar Tom, a breeder of much experience, says:

> Butter of antimony applied with a stiff feather will cure it, or mix 1 ounce of sulphuric acid with 2 ounces of vinegar and apply as above. Go over the whole band. Generally one application cures if well done. Change the range at the same time if you can.

It is not a difficult matter, as all goat men agree, to rid goats of lice by dipping them in any of the common sheep-dip preparations. The animals can not thrive to the best advantage when they are carrying a fleece full of lice; sometimes the lice become so numerous as to cause the goat to lose flesh and finally to fail to produce a good quality of mohair, or even to produce a kid, if the infested animal is a doe. Goat raisers must learn that an animal which is badly infested with lice in the winter nearly always requires extra feed; in other words, if lice are raised, they insist on being fed.

The fact that many plants which are poisonous to sheep and cattle may be eaten with impunity by goats is frequently referred to by writers for the press. It is true, however, that goats sometimes die from eating poisonous plants. The so-called "ground ivy" is specially referred to. But it is believed that goats will not eat poisonous plants to an injurious extent unless driven by hunger to do so. Fatalities to goats from eating mountain laurel, previously referred to, are occasionally reported during the early spring months. As soon as other forms of vegetation become sufficiently advanced to afford the animals enough feed, they will refuse to eat the laurel and no more harm is caused by the plant until the coming of another season. Small quantities of laurel may be eaten without ill effect, and it is only when driven by hunger to the consumption of large amounts that any harmful results follow. The use of a drench con-

taining 5 grains of permanganate of potash and 5 grains of aluminum sulphate dissolved in water has given excellent results in cases of laurel poisoning.

A few breeders of goats in the Southwest have reported that they have been losing a few goats by eating the so-called loco weed, and speak of their goats being locoed. The writer during the fall of 1907 on a trip through the Southwest saw a few goats that were locoed.

The Bureau of Plant Industry has been investigating this subject very carefully, both in the field and the laboratory, and the following is taken from that Bureau's Bulletin No. 121, Part III:

> The name loco weed has been applied to a large number of plants, but two are considered especially obnoxious—*Aragallus lamberti* and *Astragalus mollissimus*.
>
> The principal symptoms are the lowered head, slow, staggering gait, movements showing lack of muscular coordination, sometimes more or less paralytic symptoms, and, in the later stages of the disease, extreme emaciation.
>
> It is the inorganic constituents, especially barium, which are responsible for this poisonous action, at least, in the plants collected at Hugo, Colo.
>
> It has been found that locoed cattle can be in most cases cured by a course of treatment with strychnin, while locoed horses can generally be cured by a course of treatment with Fowler's solution. The animals under treatment must not be allowed to eat the loco weed and should be given not only nutritious food, but, so far as possible, food with laxative properties. To this end, magnesium sulphate was administered to correct the constipation which is almost universal among locoed animals. It should be noted, too, that magnesium sulphate may serve to some extent as an antidote to the poison.

The feet of the goats should receive some attention from the breeder, as the toes will grow very long and turn up at the points if they are not trimmed. If the goats are run on rocky or very sandy land, it may not be necessary to trim the toes, but if they grow too long they should be pared with a knife.

One of the principal enemies of the Angoras is the wolf. The best guard against wolves is a good wire fence. Sometimes the wolves dig under the fence, and then it becomes necessary to trap them. This is practiced by Mr. H. T. Fuchs, who says:

> Three steel traps are fastened to each other, but to nothing else, and catch the wolves. If the trap is made fast, the wolf will break loose, but the weight of three traps fastened together simply tires the wolf out, and it rarely drags them more than 200 or 300 yards.

In many localities the wild cats and coyotes are especially troublesome.

The wild cat is rather easy to trap and is also easily caught by dogs, which trail and tree them, then they are easy to shoot.

The coyote is very easily poisoned when hungry, but is rather hard to poison when living fat on jack rabbits. Strychnin put in car-

casses found dead is sometimes effective in killing coyotes. Trapping them is sometimes resorted to.

AMERICAN ANGORA GOAT BREEDERS' ASSOCIATION.

The American Angora Goat Breeders' Association, organized in 1900, maintains the only record of purebred Angora goats in America. This organization has a membership of 500 Angora goat breeders, representing nearly every State and Territory in the Union, and now has 65,000 animals recorded in its Angora Goat Record. The headquarters of the association are at Kansas City, Mo., though the resident office of the secretary, John W. Fulton, is at Helena, Mont.

It is the aim and purpose of this organization to encourage the raising of Angora goats in the United States and to bring about improvement in the breed. Literature relating to Angora husbandry is issued from time to time by the association for free distribution, and liberal patronage is extended to competitive Angora exhibits in all parts of the country.

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